Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

area of quadrant $FDN=\frac{1}{4}\pi DF^2=225\pi$; and area of sector $IDN : 2\pi DF^2 :: 2\pi DF$: arc IN, or area of sector $IDN=\frac{1}{2}DF\times$ arc $IN=15\{\frac{10}{3}[4\sqrt{3[(4-\sqrt{14})]}-\sqrt{7}+\sqrt{2}]\}$ square feet$=50\{4\sqrt{[3(4-\sqrt{14})}-\sqrt{7}+\sqrt{2}\}$ square feet.

$\therefore$ Area of sector $FDI=225\pi-50\{4\sqrt{[3(4-\sqrt{14})]}-\sqrt{7}+\sqrt{2}\}$.

Area of triangle $DCI=\frac{1}{2}DC\times IM=10\times5(\sqrt{14}-2)=50(\sqrt{14}-2)$ square feet. $\therefore$ The total area over which the horse can graze$=1875\pi+2(225\pi-50\{4\sqrt{[3(4-\sqrt{14})]}-\sqrt{7}+\sqrt{2}\})+2[50(\sqrt{14}-2)]=1875\pi+450\pi-1004\sqrt{[3(4-\sqrt{14})]}-\sqrt{7}+\sqrt{2}+100(\sqrt{14}-2)=2375\pi+100\sqrt{14}-2-4\sqrt{[3(4-\sqrt{14})]}+\sqrt{7}-\sqrt{2}=7249.378$ square feet.

II. Solution by G. I. HOPKINS, A. M., Professor of Mathematics and Physics, High School, Manchester, N. H.; J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pa.; and P. S. BERG, Principal of School, Larimore, N. D.

Let $ABCD$ represent the barn and A the corner to which the horse is tied. Then $FA=AG=50$ feet, and $DF=ID=BI=GB=30$. The area over which he can graze is divided into four parts, viz.: the three-quarters of a circle $AFPGA$, the two sectors GBI and IDF, and the quadrilateral $IBCD$.

$BD=\sqrt{(20^2+20^2)}=20\sqrt{2}$. $\therefore$ $ED=10\sqrt{2}$.

$\therefore$ $CE=\sqrt{[30^2-(10\sqrt{2})^2]}=10\sqrt{7}$.

Area $IBCD=$area $IBD-$area BCD.

$\therefore$ Area $IBCD=10\sqrt{7}\times10\sqrt{2}-200=100\sqrt{14}-200$.

$\therefore$ Area $IBCD=174.1657$ square feet.

$\cos\angle IDE=(10\sqrt{2})/30=.4714$.

$\therefore$ $\angle IDE=61^\circ\ 52'\ 30''$ and $\angle BDA=45^\circ$.

$\therefore$ $\angle IDA=106^\circ\ 52'\ 30''$. $\therefore$ $\angle IDF=73^\circ\ 7'\ 30''$.

Sectors GIC and IDF are equal. $\therefore$ $2\angle 73^\circ\ 7'\ 30''=146^\circ\ 15'=146\frac{1}{4}^\circ$.

Area of circle whose radius is $ID=30^2\pi=900\pi$. $\therefore$ The areas of the two sectors GBI and $IDF=(146\frac{1}{4}/360)\times900\pi=365\frac{5}{8}\pi=365.625\pi$.

Area of $GAFPG=(3\cdot50^2\pi)/4=1875\pi$. $(365.625+1875)\pi=2240.625\pi$.

$\therefore$ Area $GAFPG=7039.1475$ square feet.

$\therefore$ Entire area$=174.1657+7039.1475=7213.3132$ square feet$=26.495$ square rods.

This problem was also solved by G. B. M. Zerr, who got as an answer 7291.9868 square feet; J. Scheffer, his answer being 6889.414 square feet; Fremont Crane, his result being 6351.785 square feet; and B. F. Sine, his result being 7233.292 square feet. Cooper D. Schmitt did not solve it, but referred to a previous solution in the MONTHLY.

94. Proposed by J. A. CALDERHEAD, M. Sc., Professor of Mathematics in Curry University, Pittsburg, Pa.

What rate of income do I realize by purchasing United States 4% bonds at 105 if I sell them in six years at 104 ?

Solution by CHARLES C. CROSS, Libertytown, Md.; FREMONT CRANE, Sand Coulee, Mont.; HON. JOSIAH H. DRUMMOND, Portland, Me.; and G. B. M. ZERR, Pottstown, Pa.

$.04\times6=.24$.

$1.04+.24=1.28$, amount realized on bond.

$1.28-1.05=.23$, amount gained in six years.

$.23\div6=.03\frac{5}{6}$, amount gained in one year.

$.03\frac{5}{6}\div1.05=3\frac{4}{6}\frac{1}{3}\%$=rate of income.

Also solved by *P. S. BERG.*

95. Proposed by WALTER HUGH DRANE, A. M., Professor of Mathematics, Jefferson Military College, Washington, Miss.

A man sold a house for \$7,500 and gained a certain per cent. on the cost. If the cost had been $16\frac{2}{3}\%$ less, his gain would have been 25% greater. Find the cost of the house.

I. Solution by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pa.; and M. A. GRUBER, A. M., War Department, Washington, D. C.

The increase in per cent. gained is made up from two sources: (a) additional *gain* caused by decrease in cost, and (b) original compared with supposed cost instead of actual cost.

$16\frac{2}{3}\%$ of cost$\div$(cost$-\frac{1}{6}$ cost)$=\frac{1}{5}$, or 20% of supposed cost.

Hence 25%$-$20%, or 5%, must be due to changing the *base*, and (gain$\div\frac{5}{6}$ cost)$-$(gain$\div$cost)=5%, or $\frac{1}{20}$, or gain$\div5\times$cost$=\frac{1}{20}$, and gain$=\frac{1}{4}$ cost.

Hence $\frac{5}{4}$ cost=\$7,500, and cost=\$6,000.

Solution No. 2. The *rate* on $\frac{5}{6}$ cost$=\frac{6}{5}$ of rate on cost.

$\frac{1}{6}$ of cost$\div\frac{5}{6}$ cost$=\frac{1}{5}$, or 20%.

$\therefore$ $\frac{6}{5}$ of rate on cost+20%=rate on cost+25%, or $\frac{1}{5}$ rate=5%, and rate=25%.

Hence \$7,500=125% of cost, and cost=\$6,000.

Solution No. 3. Let $6x$=cost. Then \$7,500$-6x$=gain.

\$7,500$-5x$=supposed gain.

$$\frac{7500-5x}{5x}=\frac{7500-6x}{6x}+\tfrac{1}{4},\text{ whence } x=\$1,000,\ 6x=\$6,000.$$

II. Solution by B. F. FINKEL, M. Sc., M. A., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

1. *100* per cent.=selling price.
2. 100 per cent.=actual cost.
3. *100* per cent.$-$100 per cent.=gain.
4. 100 per cent.$-16\frac{2}{3}$ per cent.$=83\frac{1}{3}$ per cent.=conditional cost.
5. *100* per cent.$-83\frac{1}{3}$ per cent.=conditional gain.
6. $83\frac{1}{3}$ per cent.=100 per cent. of itself.
7. 1 per cent.$=1/83\frac{1}{3}$ of 100 per cent.$=1\frac{1}{5}$ per cent.
8. *100* per cent.$-83\frac{1}{3}$ per cent.=(*100*$-83\frac{1}{3}$) times $1\frac{1}{5}$ per cent.$=\frac{6}{5}\times$*100* per cent.$-$100 per cent.=conditional gain per cent.
9. $\therefore$ $\frac{6}{5}\times$*100* per cent.$-$100 per cent.$-$(*100* per cent.$-$100 per cent.)$=\frac{1}{5}\times$*100* per cent.=difference.
10. 25 per cent.=difference.
11. $\therefore$ $\frac{1}{5}\times$*100* per cent.=25 per cent.
12. *100* per cent.$=5\times25$ per cent,=125 per cent.=selling price in terms of actual cost.
13. $\therefore$ 125 per cent.=\$7,500.